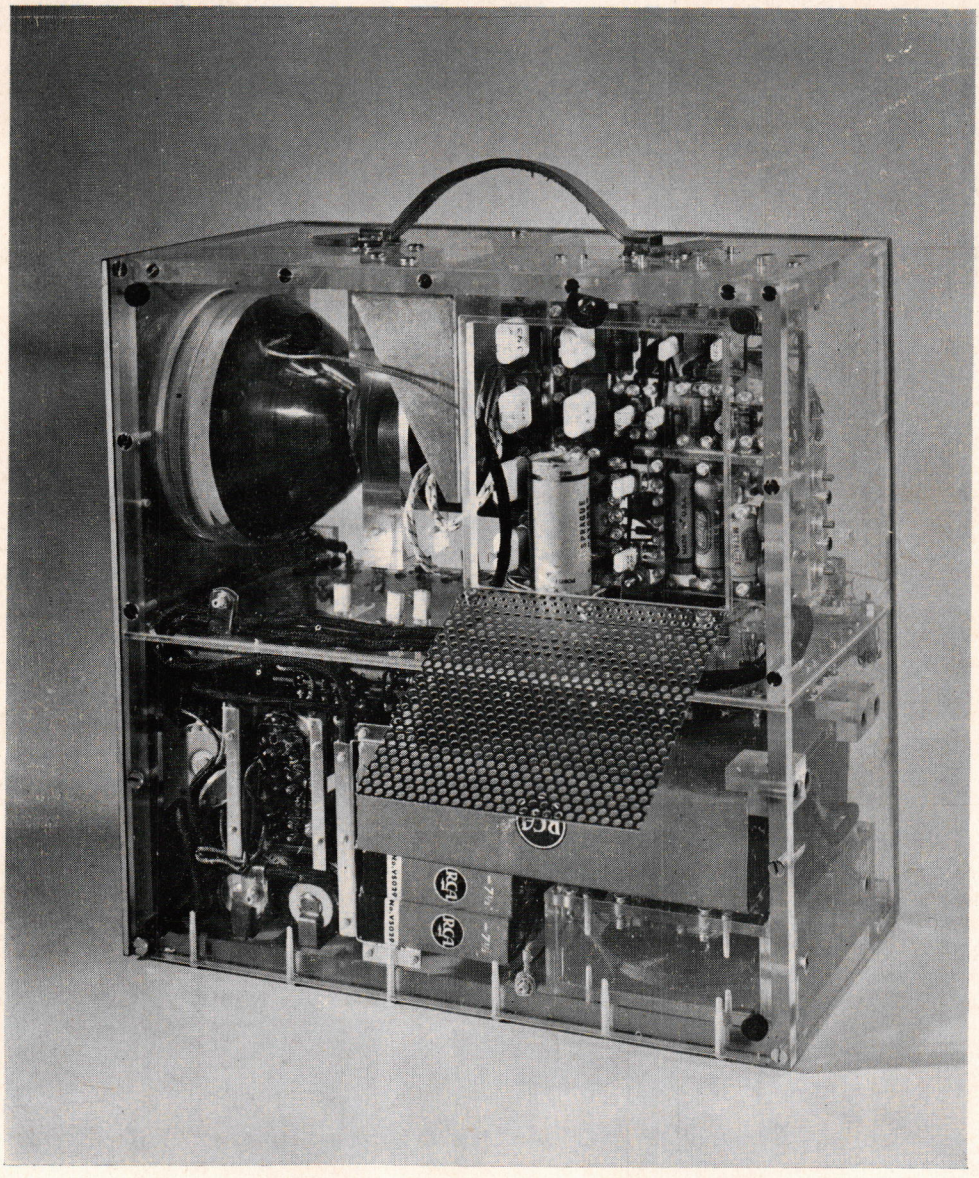
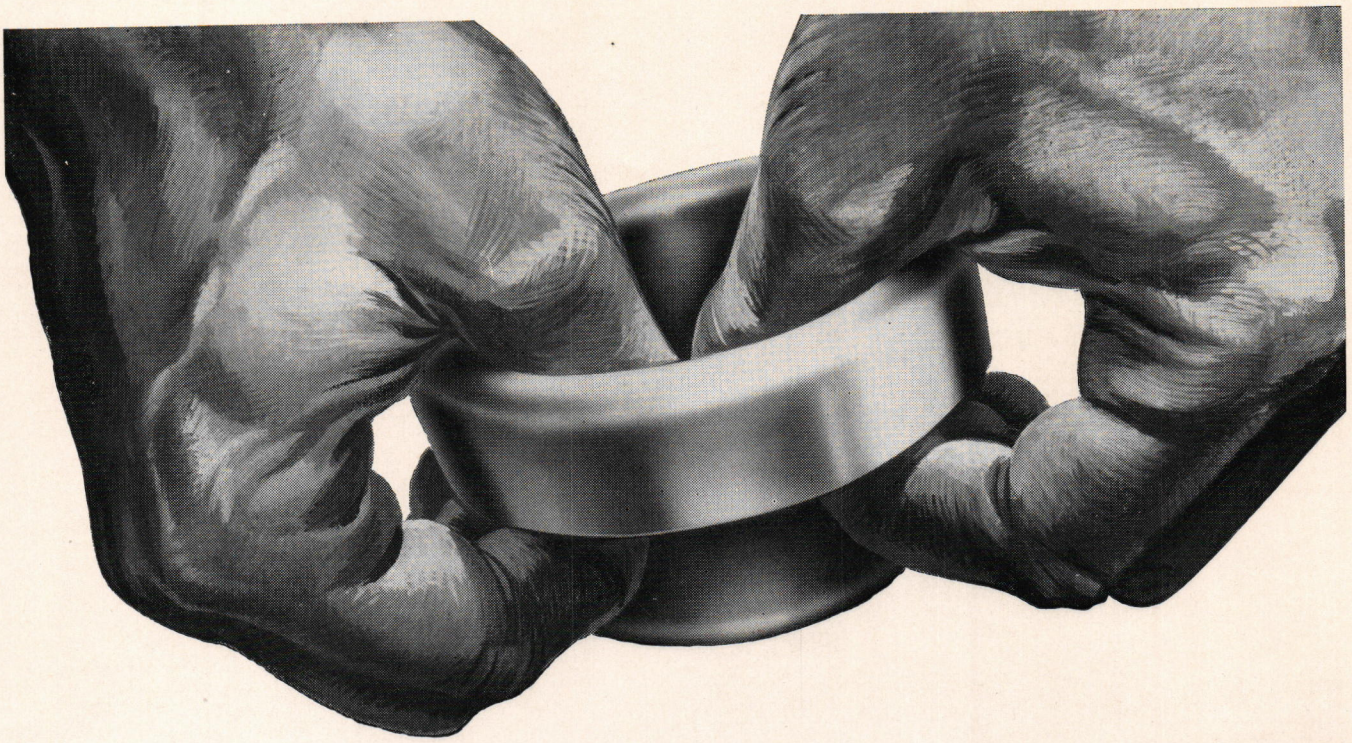
the Mechelectiv

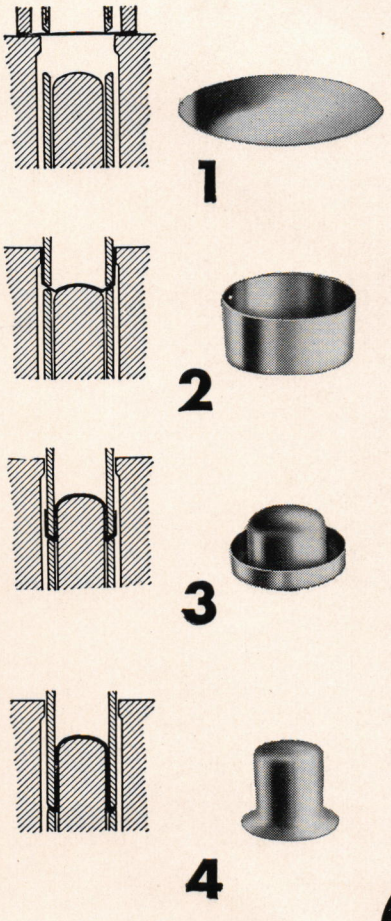
VOL. 12 MARCH 1953 NO. 4



THE SCHOOL OF ENGINEERING
THE GEORGE WASHINGTON UNIVERSITY



How to turn a high strength steel cup inside out, cold



OFFHAND, anyone familiar with high strength steels would say it couldn't be done. But one of our customers does it every day.

Employing a unique reverse-drawing method and using a U·S·S High Strength Steel especially adapted for this process, they turn out cylindrical containers of various kinds that are not only stronger than those made from carbon steel but weigh substantially less.

To accomplish this, the steel has to meet two entirely opposite requirements. It has to be so strong that it can be used in thinner gages to reduce weight, and yet must have enough ductility to satisfy the drastic fabrication method that would be considered severe even for carbon steel.

This method is used to draw cups for large, low-pressure cylinders. These cups, 14½ in. in diameter and 24½ in. deep, are drawn cold, from 12-gage steel blanks in one continuous stroke in a reverse draw press. The diagrams at left show how it is done.

Starting with a 38 in. diameter steel blank (Fig. 1) the press first draws the steel into a shallow cup (Fig. 2). As the stroke continues, the cup is literally *turned inside out* (Fig. 3) to form the finished cup (Fig. 4) which has very uniform wall thickness. Two of these cups are then welded together to make a cylinder.

Made with high strength steel, cylinders weigh about 20 lbs. less. The maker gets 26% more cylinders from each ton of steel used. Lighter weight makes cylinders easier to handle, and also pays off in lower freight costs—both on the steel from our mills and on cylinders shipped. (A customer 500 miles away saves as much as $100 per carload.)

Developing special steels for special customer needs is an important job of United States Steel metallurgists and engineers. With their tremendous background of practical experience, they are ready to work on any problem that involves the more efficient use of steel. United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

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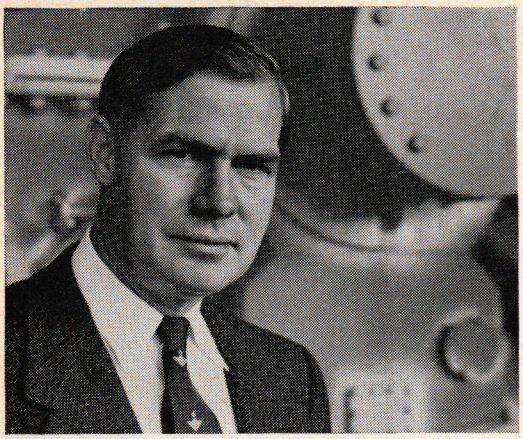
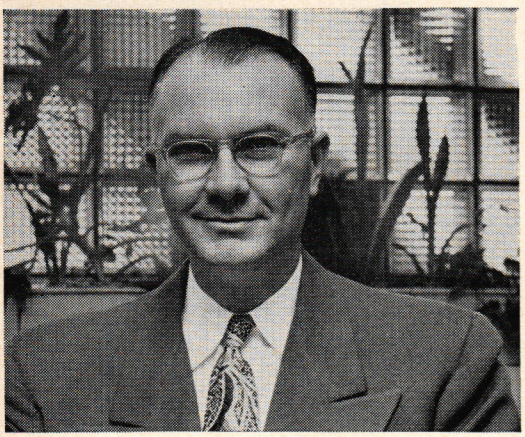


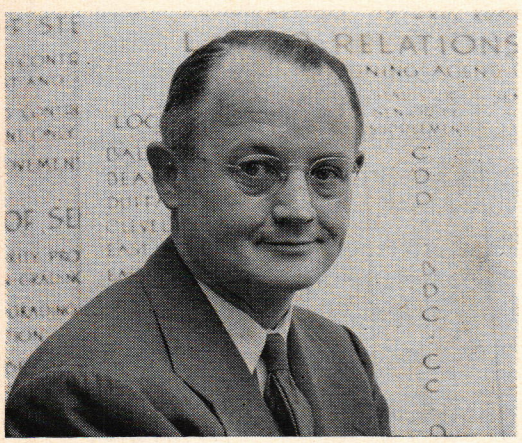
LEE A. KILGORE, *Assistant Manager*
Westinghouse Generator Engineering

A graduate of the University of Nebraska, he enrolled in the Westinghouse Graduate Student Training Course in 1927. He has contributed much to the design and development of large generators, motors and rectifiers and has authored many technical articles on these subjects.



W. H. DICKINSON, *Director*
Westinghouse Headquarters Manufacturing Engineering

Enrolled in Westinghouse Graduate Student Training Course after graduation from Texas A & M in 1930. He came up through a variety of manufacturing positions in the company and was appointed to his present post in 1951.



CLARK C. FRAME, *Director*
Westinghouse Labor Relations

Enrolled in the Westinghouse Graduate Student Training Course after graduation from Penn State in 1930. Prior to appointment to his present post, he was Manager of Industrial Relations for Westinghouse East Pittsburgh divisions.

Their formula for success will work for you

"Find out early what your talents are, what you want to do, and set your sights accordingly." That, essentially, is the success formula practiced by these Westinghouse executives.

But how do you put this formula to work? How can you be sure of choosing the right career? At Westinghouse, you'll find the answer in the Graduate Student Training Program . . . the same program that launched these men on their careers. This program gives you a clear understanding of the company and its products . . . lets you try out many types of work through planned work assignments . . . and offers the benefit of personal counsel in selecting the right field for your career.

Your Opportunities at Westinghouse

Westinghouse offers you a double-barreled opportunity for building a successful future: the Graduate Student Training Program which gets you off to a sure start . . . and the Graduate Study Program which enables you to continue your education toward M.S. and Ph.D. degrees while on the job. When you join the Westinghouse team, you get the training you need to forge ahead in the field of your choice.

For information on opportunities at Westinghouse in engineering, research, manufacturing, sales and business administration, send for our 34-page book, "Finding Your Place in Industry".

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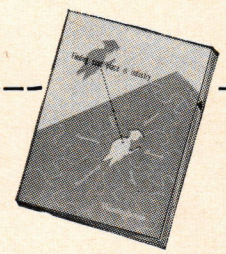

To obtain copy of "Finding Your Place in Industry", consult Placement Officer of your University, or mail this coupon to:

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District Educational Co-ordinator
Westinghouse Electric Corporation
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Philadelphia 4, Pennsylvania

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ENGINEERING SCHOOL CALENDAR

March 18—Sigma Tau, Monroe 102, 8:30 P.M.

March 21—Theta Tau Initiation, Lisner Auditorium Studios A & B, 2:00 P.M.

Banquet, Continental Hotel, 6:30 P.M.

Dance, Continental Hotel, Dress Optional, 9:30 P.M.

March 25—Engineers' Council, Building M, 2nd floor, 8:30 P.M.

March 28—Theta Tau Special Meeting, Election of Officers, Conference Room, Student Union Annex, 3:00 P.M.

April 1—Engineering Societies, Monroe Hall, 1st and 2nd floors, 8:15 P.M.

April 8—Theta Tau, Monroe 206, 8:30 P.M.

April 15—Sigma Tau, Monroe 102, 8:30 P.M.

April 18—Sigma Tau Initiation, Banquet and Dance, Place to be announced.

ON OUR COVER . . .

Portable battery operated television receiver which uses experimental transistors.

—Photo courtesy of RCA

FRONTISPIECE . . .

Not men from Mars, but welders at work.

—Photo courtesy of General Electric

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T TOP

The Ideal Professor

What makes an ideal professor? In the author's opinion, it is one who has the ability to reduce complexity to simplicity and present such material in an interesting manner. The ideal professor must also possess the know how of formulating his ideas while actually delivering them. That is to say the lecture material that is to be presented should be well prepared in advance so that the subject matter will be crystalized in his mind and upon delivery of his lecture it will be a living and interesting experience for the student. It is apparent that the ability to reduce complexity to simplicity can only be achieved by thorough knowledge of the theoretical and practical applications of the subject matter. This would indicate that the professor's background for teaching a given subject must be thorough and complete. With such a method of delivery in which ideas are developed by the analyzing capabilities of the professor, the student, in turn, will learn this process of analysis... This is indicative of the fact that education is not the mere chronological arrangement of empirical facts but the development of the student's analytical ability and his comprehension of the fundamental ideas of the subject matter. It was once said by Bishop Fulton J. Sheen, the perfect lecturer, that too many ideas flow from the notes of the professor to the notes of the student without going through the minds of either.

Graduate Engineering Study At G. W.

Robert Montgomery, BEE '55

The George Washington University recently announced that commencing in the fall term of 1953, graduate study in the School of Engineering leading to the degree of Master of Science in Engineering will be available.

The objective of the establishment of a graduate course of instruction is to enable a person to achieve a mastery of scientific principles and methods for their application in chosen fields of study.

It has been conceived that the objective stated can be served best by a faculty-student relationship in which the need of the individual student is the determining element of the curriculum. Following this thought the responsibility for the graduate program in the School of Engineering is vested in a graduate advisory committee, composed of members of the engineering profession. The chairman of the committee and at least three members of the committee will be members of the School of Engineering faculty. Each candidate will perform his study under the personal guidance of a faculty member assigned by the Graduate Advisory Committee.

The Graduate Advisory Committee for the academic year 1953-1954 will be composed of:

Martin Mason, Chairman, Dean of the School of Engineering.
Thomas Benjamin Brown, Professor of Physics.
James Henry Taylor, Professor of Mathematics.
Haaren Albert Miklofsky, Associate Professor of Civil Engineering.
Carl Hugo Walther, Professor of Civil Engineering.
Forest Klaire Harris, Professorial Lecturer in Electrical Engineering.
Norman Bruce Ames, Professor of Electrical Engineering.
John Kaye, Assistant Professor of Mechanical Engineering.
Rudolph Michel, Professorial Lecturer in Mechanical Engineering.

The graduate study program in engineering will be a course of study in the broad field of engineering, that moves freely among departments of instruction, and fields of specialization programs will be prescribed for each candidate by the Graduate Advisory Committee in accordance with his ability and needs, and as required to achieve his objective. The program may consist of formal courses and individual study under assigned faculty, but no formal curriculum common to all fields of study is prescribed. The candidate may expect to have his curriculum divided in the following approximate ratio: one-half in engineering subjects, one-fourth in physics and one-fourth in mathematics.

The following graduate courses will be offered by the School of Engineering:

Civil Engineering
- Advanced Mechanics of Materials
- Applied Elasticity
- Foundation Problems
- Prestressed Concrete
- Theory of Structures

Electrical Engineering
- Radio Wave Propagation
- Advanced Electrical Design
- Electronic Circuit Problems
- Electric Circuit Analysis
- Microwave Electronics

Mechanical Engineering
- Instrumentation
- Advanced Dynamics of Mechanics
- Advanced Fluid Mechanics
- Heat Transfer Thermodynamics

In addition all candidates will attend a seminar in engineering. Candidates may elect to include a thesis in their study program with the approval of the Graduate Advisory Committee.

All applicants for admission to graduate study must satisfy the Graduate Advisory Committee of their capacity for productive study and must have acceptable personal qualities.

Applicants holding a Bachelors degree from a recognized institution and whose record in the opinion of the Graduate Advisory Committee has prepared them adequately for graduate study in their chosen field, may be admitted to candidacy for the graduate degree without examination. Applicants who do not hold a satisfactory Bachelors degree or whose record has not in the opinion of the Graduate Advisory Committee prepared them satisfactorily may be admitted to candidacy for the graduate degree upon successful completion of a qualifying examination prescribed by the committee. This examination may be written or oral or both.

Study of a graduate character completed prior

(Continued on page 20)

Prestressed Concrete Conference

Edward R. Caldwell
Student Member, ASCE

The first Washington Regional Prestressed Concrete Conference was held on Saturday, January 31, 1953, at The George Washington University, Washington, D. C. Highlights of the Conference included papers presented by outstanding men in the field and a load test of a full size prestressed concrete beam.

The Conference—an all day session, beginning at 9 A.M.—was sponsored by The George Washington University Student Chapter of the American Society of Civil Engineers in cooperation with the District of Columbia Section of the A.S.C.E., Washington-Metropolitan Chapter of The American Institute of Architects, the Master Builders' Association, Inc., the Expanded Shale Institute, the Bureau of Yards and Docks, the Office of the Chief of Engineers, the Arlington County Department of Inspection—Building Division, and various other technical and governmental organizations. The morning session, at which the papers were presented, was held in the University's Lisner Auditorium.

Following a welcoming address by Dean Martin A. Mason of the School of Engineering, G.W.U., Professor Alvin R. Schwab presented the first paper on "What Is Prestressed Concrete?" Professor Schwab is Resident Engineer with the Southern Railway Company; a lecturer in Civil Engineering at G.W.U.; a consulting engineer; and at present is writing a book on prestressed

(Continued on page 20)

Mofoto

Dean of the School of Engineering Martin A. Mason registers for the prestressed concrete conference. Registrar is Bill Weidemeyer, Student Member, ASCE.

Mofoto

At the conference were, left to right, John J. Hogan of The Portland Cement Association, Jean Muller of the Freyssinet Co., Cedric Stainer of the Preload Co. of New York, Harold Anson of the Freyssinet Co., and Alvin Schwab of The Southern Railway.

The Engineering of a Television Show

James Tate
University Student

The operation of a television station is divided between two organization sections, program production and engineering. The production section does just that; the planning and direction of shows is their function. Engineering is charged with set-up, operation and maintenance of the equipment used in pickup, transmission and broadcast.

Engineering in a commercial operation is strictly overhead, an economic drain incapable by itself of producing revenue. With the exception of the transmitters, the equipment and personnel requirements of engineering are dictated by the needs of production. In the organization and planning of a station, the overhead status of engineering must never be overlooked or it may become a bottomless drain on funds.

A typical remote pickup show will be used as an example to outline the operation of a station. The specific event televised will be a sports event sponsored by a beverage or food company. The script for presentation of commercials, as drawn up by the advertising agency, calls for live commercials from the studio showing product use, film inserts at specified intervals, player identification by name and number from the field, and super-imposition of "trade-mark" slides on the remote picture. These requirements, while not encountered daily, are by no means uncommon, nor beyond the means of most stations. In fact to successfully compete in the commercial field, a station should be able to meet them.

For purposes of planning and description, the engineering section of a television station may be broken up into four main functional units. These are (1) Transmitter, (2) Master Control, (3) Studios, (4) Remote Pickup Units.

The equipment required at the remote location will be three cameras for field coverage, synchronizing signal generator, camera switching facilities, microphones and audio amplifier, and a microwave transmitter for relaying the video signal to the station master control.

The cameras are set up to give complete video coverage of the field of activity. Occasionally the three will be in close physical proximity, but normally two are close together and the third at a considerable distance from them. The location of this third camera is frequently somewhat of a problem. It should be far enough from the other two to provide a definite improvement in coverage, yet not beyond range of the cables connecting it to the control equipment. It must supplement the coverage of the other two cameras without causing confusion as to the direction of action. This latter factor is extremely important in a high speed sport such as ice hockey, with its many rapid changes of direction, but of little importance in a sport characterized by relatively fixed player positions such as baseball.

Each camera of the unit is equipped with from two to four lenses of different focal lengths. In setting up the cameras for the show the lenses of each camera must be set so that all are approximately in focus for some mean distance point in the field of coverage. This results in simpler and faster operation of the focus control of the camera. The optical aperture of each lens must also be set with considerable care. Unlike photographic film the mosaic of a television camera is affected by the total light flux striking it, as well as the light incident on any small portion; consequently, setting all lenses on one camera to the same f-stop number does not always result in satisfactory operation. This is a frequently overlooked point and accounts many times for the difference in picture quality between long and short lenses on the same scene.

Electrically the cameras must be so adjusted as to have the same contrast range or grey scale from black to white. Camera tubes should be selected for matching spectral response and definition. Perfection in setup and adjustment of cameras would make it impossible to distinguish the pictures of one from another except by difference in vantage points.

An easily fulfilled requirement for one of the cameras is ability to rotate horizontally and focus on an easel holding the player name and number cards, score cards, and occasionally commercial material.

The control point for the remote cameras contains a control and monitor unit for each camera, a camera switching unit, a synchronizing signal generator and usually a micro-wave transmitter control.

The camera control units set the operating conditions for each camera tube and supply operating voltages to the auxiliary circuits in the camera. Each control has a picture monitor and a waveform monitor which are used by the video technician to determine picture quality and the

amplitude of the video information signal. The picture monitor is also used by the director in the selection of the signal to be used at any time.

The camera switching unit selects between the cameras. This unit is also capable of combining the outputs of two cameras so that the two pictures are superimposed, or if mechanical masking is used at the cameras pictures are shown in montage form. Occasional use is made of electronic masking for montage effects, but the added complication to already complex gear has prevented extensive operations of this type to date.

Following the selection of the picture to be broadcast the standard synchronizing signal is added at the output of the switching unit. It is at this point that the video signal as broadcast first appears. This composite video signal passes relatively unchanged through the rest of the station.

The output of the switching unit is fed to the micro-wave transmitter or to common carrier telephone equipment for relay to the station master control.

The heart of the entire operation is the "master-control." At this point are located the station's main synchronizing generators, film and slide projectors and cameras, audio and video termination facilities for all incoming signals, signal selection and routing equipment, micro-wave transmitter for transmission of video signal to the station transmitter (if remotely located), network transmission equipment, and measurement and control equipment for all incoming and outgoing lines as well as intra-station lines.

The signal from the remote camera equipment as received on the micro-wave or from the common carrier facilities goes first to a distribution amplifier. This distribution amplifier provides a number of signals identical with the one fed to it. One signal goes to a switching unit which is the exact counterpart of that used at the remote location. Another signal feeds a picture monitor which is used by the technician who operates the switching unit. In addition to the remote picture, this operator has pictures from all sources used in the program, and a monitor on the outgoing line which shows the same picture that is seen on home receivers.

A third signal from the distribution amplifier is fed to a synchronizing generator phasing unit. Here the video information is stripped from the composite signal and discarded, while the standard synchronizing signal is used to generate pulses which are used to control the station's synchronizing generator. This insures that the output of the station generator is always in exact synchronization with the remote signal within master control.

In most cases, the phasing unit will not be used with films which are picked up in master control. This is one of the weak points in the entire chain. Most projectors are driven by synchronous motors from the sixty cycle power lines, but their phase position is determined by the synchronizing generator and manually adjusted to coincide with it. So long as the synchronizing generator is stabilized by the a.c. power line this system works very well, but when the synchronizing generator is controlled by some other source a phase difference arises between synchronizing generator and projected picture. This phase difference causes narrow light or dark bars to drift up and down through the picture from the projector. While several methods have been devised to overcome this difficulty, none are in common use.

In the studio, two or more cameras which are exactly the same as those used at the remote location are used to pick up the live commercials. Control of lighting in the studio, greatly simplifies camera operation and set-up.

The outputs of the studio cameras go to a switching unit which allows full selection and combination. This output in turn feeds the master control switching unit, where it appears along with signals from the remote location, network, and slide and film cameras. In this switching unit, signals from the various sources are selected and/or combined to provide the finished show for broadcast. This signal is sent to the transmitter by either common carrier or the station's own facilities.

At the transmitter the incoming signal is monitored and any corrective measures necessary to remove extraneous signals or to correct for any minor deterioration of the signal are made. This corrected signal is then broadcast.

Throughout the station, the equipment which has been mentioned will be supplemented by control and monitor equipment to assure best quality and proper transmission amplitudes.

We now have a complete station with all equipment in place, properly operating and interconnected. Engineering's part in the show is now practically complete. From this point on all that need be done is to make minor operating adjustments for peak performance and any emergency repairs that might be needed.

The operation uses a physical plant costing about $250,000, involving around 750 electron tubes of more than 50 different characteristic types and requiring fifteen to twenty men to set up and operate.

The show opens with a film commercial following which the video technician on the master control switching unit switches to the incoming remote signal.

The remote portion of the show starts with a series of introductory views and comments by the

(Continued on page 30)

ENGINEERING PERSONALITIES

GEORGE GAMOW

During the past few years a new phase of engineering has appeared in the professional field—the applications of atomic power. This concept is still in its infancy, relatively speaking, and is still considered in the realm of theoretical physics, but many advances have already been made along the engineering line. A notable figure in this field is Professor George Gamow of the Physics Department at George Washington.

The story of Professor Gamow (pronounced ga-mov) began in Odessa, Russia on March 4, 1904, the date of his birth to Anthony and Alexandra Gamow. He was raised in Odessa and during the years 1914-20 he was a student at the Odessa Normal School.

He left Odessa in 1922 to further his education at the University of Leningrad where four years later he received his BS degree. He remained at Leningrad until 1928 when he received his Ph.D. in Physics.

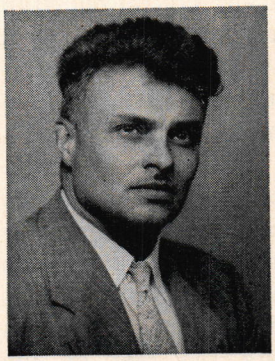
During the summer of 1928 Dr. Gamow was a fellow at the University of Gottingen in Germany. He received a Carlsberg fellowship for the year 1928-29 at the University of Copenhagen in Denmark and during the year 1929-30 was a recipient of a Rockefeller fellowship at Cambridge University.

In the school year 1930-31 he again attended the University of Copenhagen and at the conclusion of his studies there he returned to Leningrad to work on a masters in research at the Academy of Science until 1933. It was during this latter period in Leningrad that he married Loubov Wachminqewa. Their wedding was on November 1, 1931.

After having received a thorough education in the best universities in Europe and Russia, he began lecturing at the University of Paris during the winter of 1933-34. Then in 1934 he came to the United States and started his career with George Washington University in September when he received a professorship in theoretical physics. In 1940 he became naturalized and during the war he worked on several projects with the United States Navy and Air Force.

(Continued on page 26)

AL MOE



Al Moe, sometimes referred to as "the old man of GW," is certainly one of our most colorful students. Al was born in Minneapolis, Minnesota on April 30, 1913 of Norwegian parents. He attended grammar school in Minneapolis, and high school in Minnesota, Florida, Texas, and finally at McKinley High here in Washington. Al was an outstanding member of the Cadets while in high school, and in 1932 he joined the U. S. Navy.

In 1933 he began his long career at GWU; he majored in Architecture and Fine Arts receiving his AA Degree in 1948 and his BA Degree in 1949. Al is now working for a degree in Civil Engineering.

Al was not "all work and no play" during his early years at GW; in 1934 he met Donna Lois Frosbug in one of his Architecture classes, and in 1937 he married her. They now have three children: Greta, Tom, and Karen.

He was the architect for Federal Airways Division in the Civil Aeronautics Administration at the beginning of the war, and designed several important buildings; he also attended special courses at the University of Florida, University of Indiana, and Purdue U. in conjunction with this work.

Al was called to active duty in the Navy soon after the start of the war. As an architect he designed numerous buildings for the Navy, including some at the Naval Air Station in Anacostia. He transferred to the SeaBees in order to get overseas duty, and his battalion saw action in the invasion of Okinawa.

In the winter of 1945 Al returned to the States and to inactive duty. He returned to CAA in time to design the new jet test facility for the CAA Technical Development Center at Indianapolis; he was then transferred to Indianapolis as Resident Engineer in Charge of Construction to supervise the building of this and other buildings. He returned to Washington and GWU early in 1946; at present he is with the Navy Department as the head of Grounds and Structures Section in the Shore Establishments Division of the Bureau of Aeronautics.

(Continued on page 16)

It took a lot of engineering to make a better "grasshopper"

Engineers at Western Electric's St. Paul Shops are well pleased with their new-style "grasshopper" fuse—a small fuse used in Bell telephone central office equipment. The former model—in production for years—had been gradually refined 'til it seemed almost beyond further improvement. It was simple, inexpensive, efficient, came off the line fast. But . . .

It's an old Western Electric engineering custom to keep trying to make Bell telephone equipment still better, at still lower cost. The "grasshopper" was studied by a young engineer out of the University of Minnesota, Class of '40, who joined the Company in 1946. His studies indicated the most effective way to improve efficiency and cut costs further was to change the design.

Pursuing this lead the engineer and his group saw their opportunity to make an important contribution. They investigated the latest tooling techniques, new metals, finishing materials and methods, all of which are constantly under study by engineers at Western Electric plants. A simplified design, which permitted the use of the most modern tooling methods, resulted in a better fuse at lower cost that is saving thousands of dollars a year for Bell telephone companies.

There's an endless stream of such challenging assignments at Western Electric. Engineers of varied skills—mechanical, electrical, civil, chemical, metallurgical—find real satisfaction in working together on the important job of providing equipment for the best telephone service on earth.

How the grasshopper fuse works

Small fuses like this are used by the millions to protect certain telephone central office circuits against current overloads. Odd in appearance, the fuse is called the "grasshopper" because of its spring which is released when the fuse blows, displaying an indicator "flag" in open view and tripping an alarm so the trouble can be spotted and corrected at once.

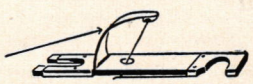
NEW DESIGN

ONE-PIECE FORMED SPRING WITH INDICATING FLAG—MADE BY STANDARD PUNCH PRESS METHODS.

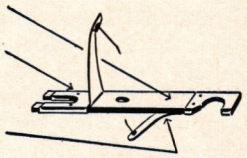
FIBRE STRIP SPRAYED WITH COLORED LACQUER FOR CODE IDENTIFICATION.

INDICATOR SPRING HELD BY AND STAKED TO FLAT TERMINAL—SOLDERING ELIMINATED.

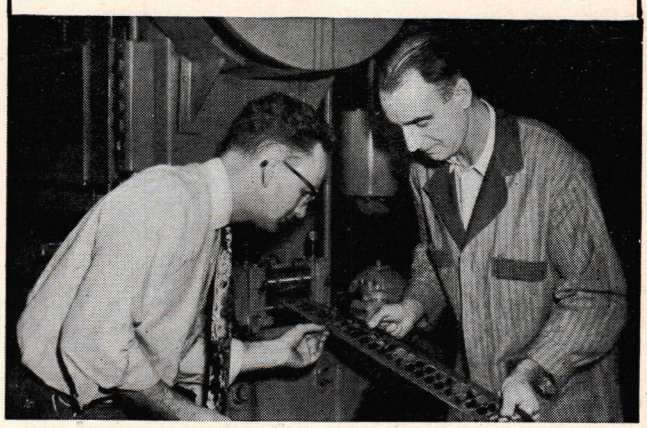
PRE-FORMED RADIAL BEND IS NOT VULNERABLE TO DEFORMATION BY IMPROPER HANDLING—NO ADJUSTMENT FOR TENSION NECESSARY.



ASSEMBLED FUSE



BLOWN FUSE



• *Engineer and punch press operator check production of parts for newly designed grasshopper fuse.*

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NEWS AND VIEWS

ENGINEERS' BANQUET

The annual Engineers' Banquet is scheduled for Saturday, May 3, this year, but the location has not yet been selected. Harry Kriemelmeyer, President of the Engineers' Council, announces that the price for the dinner and the evening's entertainment will not exceed $2.50.

Following the dinner, awards will be presented to the outstanding persons in the Engineering School by the professional societies, the engineering fraternities, and the Engineers' Council.

Rumors are circulating that a skit will be presented by some of the graduating seniors depicting their impression of life in the Engineering School. While we have no definite word on any rebuttal by the Engineering School Faculty, past performance leads us to believe that the professors will outdo the seniors. This will be a show you will not want to miss.

We'll see you at the Banquet, May 3.

CAREER CONFERENCE

The Third Annual Career Conference of The George Washington University was held on February 25 with continuing success. The keynote speaker of the general forum was former Vice-President of the United States Alban W. Barkley. Mr. Barkley spoke about developments in government and business during the time he has been in public service. Mr. Barkley reminded the audience that, despite appearances to the contrary, everything had not yet been accomplished and that opportunities today were better than at any time in the past.

Following Mr. Barkley's keynote speech the Conference separated into various forums representing different professional interests. The speakers at the Engineering Forum were Mr. Henry A. Sawchuk, Examining Placement Division, U. S. Civil Service Commission; Mr. John D. Braymer, Chief, Occupational Analysis Division, Department of Defense; Mr. Thomas Meloy, President of Mel-Par, Inc.; and Mr. Martin Bennett, Consultant Engineer, Washington, D. C. These speakers gave a composite picture of the engineering opportunities in government, the armed services and private business.

The forums were followed by a general discussion over coffee and doughnuts at the Student Union.

Walter Scott was the Engineering Forum Chairman, representing the Engineers' Council.

ENGINEERS' BALL

The happy throng that attended the 22nd Annual All-U Engineers' Ball at the Washington Hotel on Saturday, February 28th saw Miss Joan Gallagher crowned Queen of the Engineers by Jerry and Jimma Strong, WMAL radio and television personalities. Queen Joan was presented with an engraved compact and a spray of American Beauty roses. She had been picked after much deliberation from the four finalists which included Miss Gallagher, sponsored by Kappa Sigma Fraternity; Miss Louise McDavitt, Sigma Chi candidate; Miss Marylin Ketler, Phi Sigma Kappa; and Mrs. Ava Hutchison, Sigma Phi Epsilon. Selection was extremely difficult since the social fraternities submitted an outstanding group of candidates that represented the cream of GW's beauties. The final selection was made by Professor B. C. Cruikshanks advisor to the Engineers' Council, and Jimma and Jerry Strong.

We were honored by having Dean Emeritus Frederick M. Feiker in attendance with his charming wife.

Chairman Tom Flanagan and the entire Council are to be congratulated on the outstanding success of this year's Engineers' Ball.

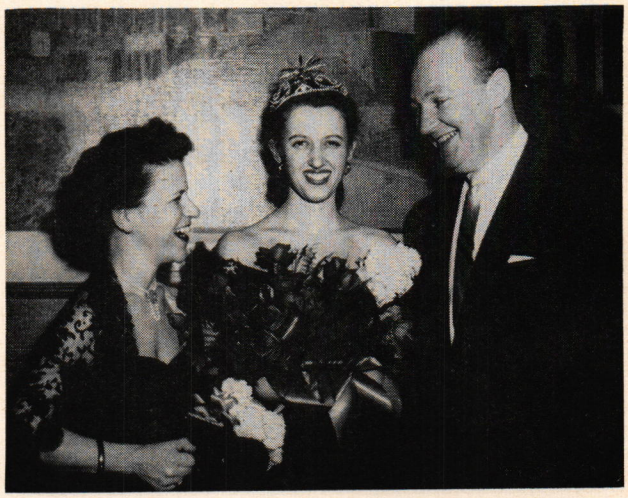

Photo by Beale

Queen Joan and Jimma and Jerry Strong

ALO AMIGOS

Recently MECHELECIV received a letter from the students of Eccola de Engenharia da Universidade de Minas Gerais (School of Engineering of Minas Gerais State University, Brazil) asking for issues of MECHELECIV. We were proud to send them the copies of MECHELECIV and we hope that by its high technical standards and point of view that our magazine will reflect the spirit of the engineering students at George Washington University.

We also hope that this will be the beginning of new friendships, and in the future we would like to hear from other engineering students in foreign countries.

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Costs would tumble.

Then let business pass those savings on to the public.

Prices would tumble.

Finally, suppose the consumer did his part, and bought. There would be such business as the world never dreamed of. More store clerks would be needed to handle the demand, more transportation workers to haul the goods, more workers to produce them. The more demand and production, the lower the costs and prices; the lower the costs and prices, the more the demand and production. And everyone would have more and more of the things he wants.

Why isn't it done? Greed, fear, misunderstanding.

Honesty, hard work, unselfishness would do it, for the principle has been proven a thousand times. We've tried laws, contracts, strikes, slowdowns—and all we've got is hatreds, shortages, and periodic lay-offs. Is there a leader great enough to rally all America to put this *positive* approach to work? The approach that every honest man knows in his heart is *right.*

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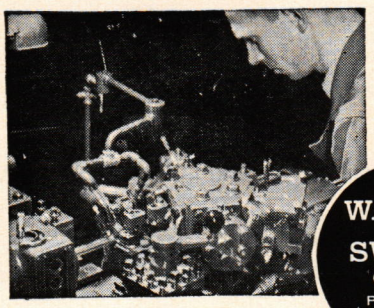

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IRE

● Members of the AIEE and IRE held a joint meeting on January 14, 1953. The members heard a very interesting talk by Mr. George Abraham, a GWU faculty member, on "Intercollegiate Carrier-Current Broadcasting." The talk was illustrated by slides which showed the methods used to generate signals and how they were transmitted over existing power lines.

AIEE

● At the February meeting of the AIEE the members heard a talk by Mr. David Ginsberg, who heads the design section of the Electrical Power Branch, Engineer Research and Development Laboratory, Fort Belvoir, Virginia. Mr. Ginsberg spoke on the "Design of Small Permanent Magnet Generators".

The April meeting has been reserved for the presentation of student papers. The winner of the contest at GWU will represent the school at the downtown ASME chapter, and at the regional conference at Princeton University, with a possibility of winning cash prizes at both places.

Prizes are to be given for the branches with the best attendance at the regional conference so, if possible, all members should plan to attend. Anyone interested should contact one of the GWU branch officers for details.

ASME

● A meeting of the Student Branch of ASME at GWU was held on February 4, 1953. Mr. William Ahrendt, president of the Ahrendt Instrument Co., gave a very interesting talk on servo-mechanisms.

At the meeting of March 4, 1953, the speaker was Dr. Miles Robinson of the Air Transport Association of America. His topic, "The Cost of Speed", dealt with the economic factors to be considered in these days of high speed travel, and was highly enjoyed by the members present.

ASCE

● The ASCE Student Chapter of GWU held its third meeting of the scholastic year on January 7, 1953. The guest speaker for the evening was Mr. Moses Freedman, noted construction engineer, who is Chief of the Estimating Department and General Construction Superintendent for the Standard Construction Company of Washington, D. C. A graduate of George Washington University, class of 1936, Mr. Freedman gave an informal talk on "How Contractors Get Bids and Make Profits."

His speech was a detailed expose on how a large construction firm acquires and manages a building project from beginning to end.

On Wednesday, February 4, 1953, the GWU Branch of the ASCE held its first meeting of the second semester of the 1952 scholastic year. A technicolor film prepared by the Bethlehem Steel Company entitled "The Open Road" was shown. It depicted the entire construction of a modern concrete highway.

THETA TAU

● Plans are being made for the annual birthday party of Gamma Beta Chapter to be held on March 21. The initiation, to be held Saturday afternoon, will take place in Lisner Studios A & B. The banquet and dance will be held at the Continental Hotel in the evening. The new brothers will furnish entertainment during the dance.

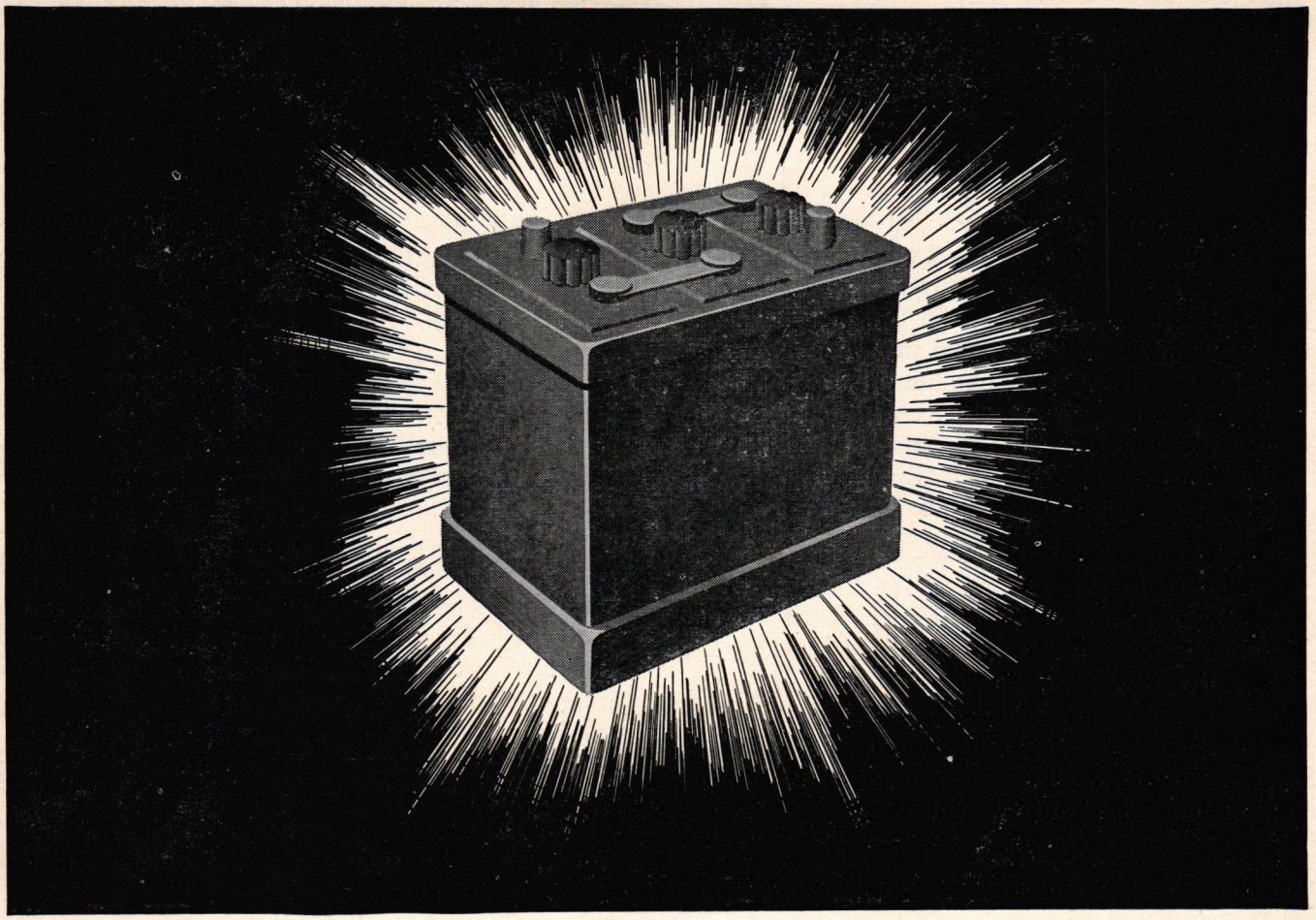
The present group of pledges include: Julian Andia, Barry Boyce, Walt Cornell, Bob Gardner, Bernie Kilday, Paul Kuzio, Phil Martin, Casey Mohl, Bob Van Sickler, Joe Vaughn, George Wagner, Bill Weidemeyer, and Bob Withan. Honorary members will also be initiated at this time.

Later in March an election will be held to obtain new officers for the coming year. Plans are being made to begin a new pledge class before the end of the school year.

MOE *(Continued from page 12)*

In spite of this active outside life, Al has still found time to be active in extra-curricular activities at GW. He was Vice-President of the Engineers' Council in 1951, and President in 1952. He is the present Regent of Theta Tau, and is also a member of Sigma Tau, Omicron Delta Kappa, Pi Delta Epsilon, and the Masonic Club. He is presently on the Cherry Tree Staff, and in 1951 he was Associate Editor of Mecheleciv, and Editor in 1952. Al was also elected to Who's Who in American Colleges and Universities in 1953.

Outside GW Al is a member of the American Society of Civil Engineers, American Society of Military Engineers, Institute of Aeronautical Sciences and Civil Engineer Corps Reserve Association PRNC. He is a registered civil and architectural engineer in the District of Columbia, Scottish Rite 32° Mason, a consultant to Groll, Beach Associates, Architects and City Planners, and W. H. Seabrooke and Associates, both of Washington, and Commanding Officer of the N.R.C.B. Div. W-1 at the Naval Gun Factory.



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ALUMNEWS

A boxed notice which included an editorial request for comments on the magazine resulted in a letter from **Vernon E. Benjamin,** B.E.E. 1952. Mr. Benjamin submitted to the "Mecheleciv" some excellent advice which should improve the magazine in the future. He complimented us when he stated, "Mecheleciv is to be congratulated on the general excellence of its written material. The reputation of the School of Engineering is enhanced by such a good publication."

Jim Simpson, B.E.E. 1952, who is with the General Electric Company on the Test Program recently sent us a congratulatory letter on our October issue. Jim sent us a nice piece of news concerning G.W.: "G.W. graduates stack up pretty nicely against the other graduates from more famous schools. Don't let anyone sell G.W.'s Engineering School short, because they are learning much more than they realize."

Herman Norwood, B.E.E. 1952, is now working at the Audio and Video Products Corporation here in town.

Oliver N. McDorman, B.A. in Psych. and E.E. 1937, has written several papers on corrosion and cathodic protection of steel while on the staff at the National Bureau of Standards. From 1942 to 1945, Mr. McDorman was an electronic tester at Westinghouse Electric Company. He joined the Bureau as a physicist in 1946.

Clarence (Curly) Kuldell, B.M.E. 1951, is employed at I.B.M. here in town. Curly is now living at 1312 N. Taylor St. in Arlington but still finds time to stop by the G.W. Campus to see his many friends.

Elwood H. Mullins, B.E.E. 1949, was married last June 7 to Mary V. Whitefield. The happy couple live in Hyattsville, Maryland. Congrats.

Marvin D. Weiss, B.E.E. 1949, received his Master of Chemical Engineering degree from the Polytechnic Institute of Brooklyn on June 11, 1952.

John W. Glessner was married to Helen C. Lane last May 31. They are residing in Woodlawn, Pa. Belated congratulations.

Ed Younger, B.C.E. 1952, is recovering from a recent illness. Ed was cheered up from his aches when his wife, Nell, presented him with a baby daughter, Renee Janelle.

Ernest T. Hix, B.M.E. 1949, and Ll.B. 1952, is now employed at the Sheffield Corporation as a patent attorney. His new address is 2208 Rugby Road, Dayton 6, Ohio.

Raymond A. Heindl, B.S.C. and B.C.E. 1917, is now the chief of the refractories section at the National Bureau of Standards here in Washington. Before going to the Bureau in October 1923, he worked as a chemist for the Carborundum Company, a chemist for the Aluminum Company of America, and a chemical engineer and assistant superintendent for the International Abrasive Company. He is the author of several research papers on refractories and optical glass. He is a Fellow of the American Ceramatic Society and has held executive positions in that society; he is past chairman of the Committee C-8 and a member of the American Society for testing materials. He has also held the chairmanship of the committee on refractories of the Federal Specifications Board.

Ed Bailer, B.E.E. 1951, is now living at 3518 Farthing Drive, Silver Springs. Ed is employed by PEPCO. He has been with them since his graduation.

August Eccard, who attended Columbian College (now G.W.) has retired from his position of Associate Engineer in the Architect's Office of the Capitol. Mr. Eccard ended a 100-year family tradition when he retired March 1, 1953. His grandfather started work in that office in the 1850's. Mr. Eccard started his career in the Architect's Office in 1903. In 1903 he rose in grade to draftsman. In 1921 he became Civil Engineer and later was promoted to Associate Engineer. Mr. Eccard studied drafting at home in his youth and later attended evening classes in engineering at Columbian College. Among his capitol jobs were the setting up of stands at the Capitol for inauguration ceremonies and the remodeling of the District Court House.

Leopold Golden, B.M.E. 1950, who lives at 508 Bay View Ave., Seaside Heights, N. J., says he would like to hear from some of his old school chums. Leopold is the proud father of two girls, 3½ years and 9 months old. He is managing a department store now.

(Continued on page 30)

Engineers get ahead at Boeing

A major guided missile program is just one of Boeing's many projects-with-a-future. Other programs, which offer *you* plenty of room to get ahead in engineering, are America's first-announced jet transport project, research in supersonic flight and nuclear-powered aircraft, and development of the B-47 and B-52 jet bombers, the airplanes that have given Boeing more experience with multi-engine jets than any other company.

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BOEING

CONCRETE *(Continued from page 9)*

illustrated his talk with slides depicting the fundamental characteristics of prestressed concrete and basic information needed in the design of prestressed concrete structures. Prestressed concrete was compared with ordinary reinforced concrete and its advantages brought out.

Following Professor Schwab, Mr. Cedric Stainer presented a paper entitled "How to Prestress Concrete." Mr. Stainer is the Acting Chief Engineer of the Preload Company of New York. Mr. Stainer's background includes a degree from

Mofoto

Small portion of group attending the load test of the pressessed concrete beam. Several students are noticeable in the foreground.

London University and a period of employment with the Freyssinet Company in France before coming to the United States. He is an Associate Member of the American Society of Civil Engineers; a member of the Institute of Civil Engineers and the Institute of Mechanical Engineers in Great Britain; and a member of the Society of Civil Engineers of France. The paper "How to Prestress Concrete" dealt with the various methods developed in this country and abroad to accomplish this purpose. Numerous slides were used for illustration and comparisons were drawn between the different methods. Both pre- and post-tensioning were discussed and the advantages of each were brought out by Mr. Stainer.

Mr. John J. Hogan of the Portland Cement Association spoke on the "Application of Prestressed Concrete to Bridges." Mr. Hogan, a New York University graduate, is a licensed Professional Engineer in New York State; a consulting structural engineer with the Portland Cement Association; an Associate Member of the American Society of Civil Engineers; a member of the American Concrete Institute; the Military Engineers; Tau Beta Pi; and the Bridge Commission of the Highway Research Board. Mr. Hogan began by deriving the basic equations necessary for the design of prestressed concrete beams. Photographs were shown of many prestressed concrete bridges built in this country. Mr. Hogan pointed out that some bridges had been designed and constructed by county forces, thereby disproving the contention that prestressed concrete

(Continued on page 22)

GRADUATE SCHOOL *(Continued from page 8)*

to admission to candidacy for the graduate degree will be considered by the Graduate Advisory Committee in prescribing the candidate's program of study provided it contributes substantially to the achievement of mastery of principles and methods.

A minimum of one year full-time study as approved by the Graduate Advisory Committee must be completed successfully. Candidates with limited areas of unsatisfactory preparation may be required to complete any necessary remedial or preparatory study in addition.

Study applied to satisfy requirements for another degree may not be applied to satisfy requirements for the graduate degree in engineering.

Candidates for the degree must demonstrate substantial mastery of scientific principles and methods of their use in the candidate's area of interest by successful completion of the prescribed program of study and a comprehensive examination.

The candidate's scholarship must be satisfactory to the Graduate Advisory Committee and will commonly be required to be equivalent to grade "B". A student whose scholarship is considered to be unsatisfactory will be suspended by the Dean upon the recommendation of the Committee, or his assigned advisor.

With the approval of the Graduate Advisory Committee the candidate may be permitted to include a thesis in his program of study. The candidate will be subject to an oral examination of his thesis.

In addition to the course examinations, the candidate must complete successfully a comprehensive examination on his area of study. The examination may be written or oral, or both, at the discretion of the Graduate Advisory Committee.

The candidate must complete successfully the program of study prescribed within three years if a full-time student, and within five years if a part-time student."

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CONCRETE *(Continued from page 20)*

is too complicated for most purposes. The methods used in the construction of these bridges were described in detail. Mr. Hogan was kind enough to furnish the group with the literature on prestressed concrete prepared by the Portland Cement Association.

The paper "Application of Prestressed Concrete to Buildings" was presented jointly by Mr. Harold Anson and Mr. Jean Muller of the Freysinnet Company, Inc., of New York. Mr. Anson graduated in 1945 from the University of Oklahoma; spent several years in oil field construction; received a Civil Engineering degree from Columbia University; and at present is a design and field engineer with the Freyssinet Company. Mr. Anson limited his remarks to the fundamentals and advantages of prestressed concrete in buildings.

Mr. Muller is a 1947 graduate of the Central School for Arts and Manufactures, Paris, France. He worked for the Freyssinet Company in Paris and for the past two years has been with that company in their New York office. Mr. Muller, incidentally, is the designer of the huge arch bridges now being constructed in Venezuela which were recently featured in *Civil Engineering*. Mr. Muller explained and illustrated various features incorporated into prestressed concrete buildings. Numerous slides were shown of some of the most recent construction projects in France. Methods of insuring continuity in prefabricated beams and girders and methods of tying longitudinal and transverse beams together were explained by Mr. Muller in detail.

Following the presentation of the papers the Conference moved to the plant of Arban and Carosi, Inc., contractors for the prestressed concrete work, in Alexandria, Virginia, just across the Potomac from Washington. Lunch was graciously furnished by Arban and Carosi, Inc. The load test of the beam was preceded by a description of the building for which it had been designed and the method of manufacture. The beam was to be used to furnish a clear span of 45 feet in the basement of the Arlington Forest Methodist Church of Arlington, Virginia. The architects were Spector and Montgomery of Falls Church, Virginia; Arthur J. Downing was the structural engineer; Miller Brothers of Arlington, Virginia, are general contractors; the prestressed concrete work was designed by Professor Alvin R. Schwab.

The beam was a hollow box girder 17 inches deep, 24 inches wide at the bottom, and 21½ inches wide at the top. The sides of the beam were indented at the bottom flange to allow for placement of the prestressing steel. This consisted of three ⅞ inch diameter "Stressteel" (Lee McCall) bars. Two of these were on the outside of the beam; the third was located in the hollow of the interior of the beam. At the ends of the beam there were solid blocks which were used for anchorage of the steel and to distribute the concentrated load from the bars to the concrete section. At these points the two outside bars were bent up and they bore against this solid depressor block. Transverse holes were provided through these blocks to allow for transverse prestressing.

The beam was constructed by making a mortar joint on the end of each block before it was placed against the adjoining block. A small prestress was

(Continued on page 24)

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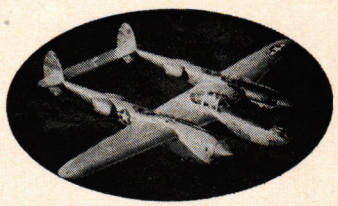

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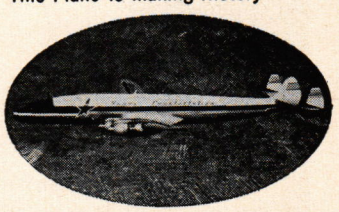

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This plane – which exists only in the brain of an engineer like yourself – is one reason there's a better future for you at Lockheed. For Lockheed will always need engineers with ideas, engineers with imagination, engineers who build the planes that make history.

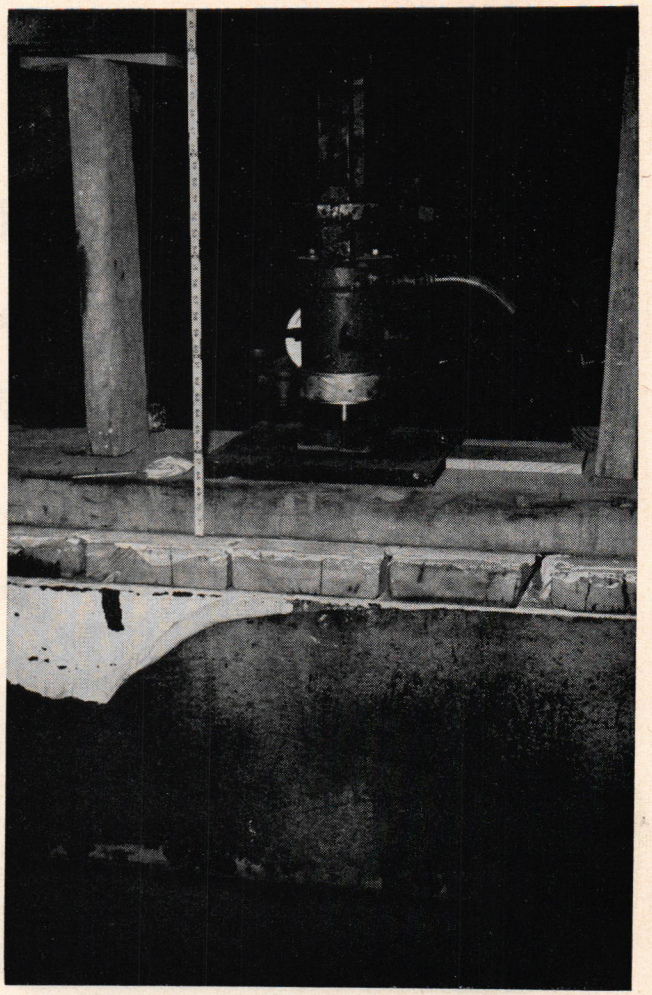
CONCRETE *(Continued from page 22)*

applied to squeeze the blocks together during the period when the mortar was setting up. After allowing the mortar to cure for a day, the full prestress was established. In the actual structure concrete fill will be placed between the beams and on top of them. In order to simulate the actual condition in the building, the test was jacketed with concrete to a size of 24 inches wide by 19½ inches deep.

Lightweight aggregate (expanded shale) was used in the manufacture of the blocks in order to keep the steel area to a minimum. High-early strength concrete was employed. 5,000 psi concrete was specified.

The reinforcing was imported from England by way of the Tampa Bay Bridge construction project—also prestressed concrete. The bars are of high-carbon silico-manganese steel and have special threads on each end. These threads decrease in depth on the inside end of the threading; the nut has the same type threads thereby insuring nearly full diameter of the bar to the end of the beam at the anchorage points.

The beam was supported at its ends by steel bearing plates on wood blocks. The load was applied by a hydraulic jack supported by a 24" I-beam from above as shown in the photographs. This was the same jack used for prestressing the steel reinforcement. Deflection of the beam was measured by taking level readings with an ordinary surveyor's level on a rule placed on the beam behind the point of application of load. The beam failed at approximately five and three-quarters live loads with a maximum deflection of approximately 6½ inches. The applied load was slightly greater than eleven and one-half tons (23 kips). The beam after failure is shown in one of the accompanying photographs.



Mofoto

Prestressed concrete beam under test. Load is applied by means of hydraulic jack.

The Conference was completed with a dinner that evening at the New Colonial Hotel in Washington. The speaker was the Honorable George W. Malone, United States Senator from Nevada. Senator Malone is the only practicing engineer ever elected to the Senate. The Senator's speech was followed by movies about prestressed concrete.

Credit for the outstanding success of this first Washington Regional Prestressed Concrete Conference, attended by approximately 450 engineers, architects, contractors and others, must be shared by Professor Alvin R. Schwab, who made the arrangements for the load test of the beam; Mr. Darrell Rodgers, student chairman of the Conference and Mr. Robert Rodgers, President of the

(Continued on page 30)

New
INTRIMIK
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TRI-POINT MICROMETER
A new contribution to accuracy and production from Brown & Sharpe; for measuring bores or holes directly — without masters, reads like a conventional micrometer. Eliminates many expensive plugs and setting rings. Sixteen sizes to measure from .275" to 4.000". Extensions are available to facilitate measuring deep holes. Write for illustrated Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.
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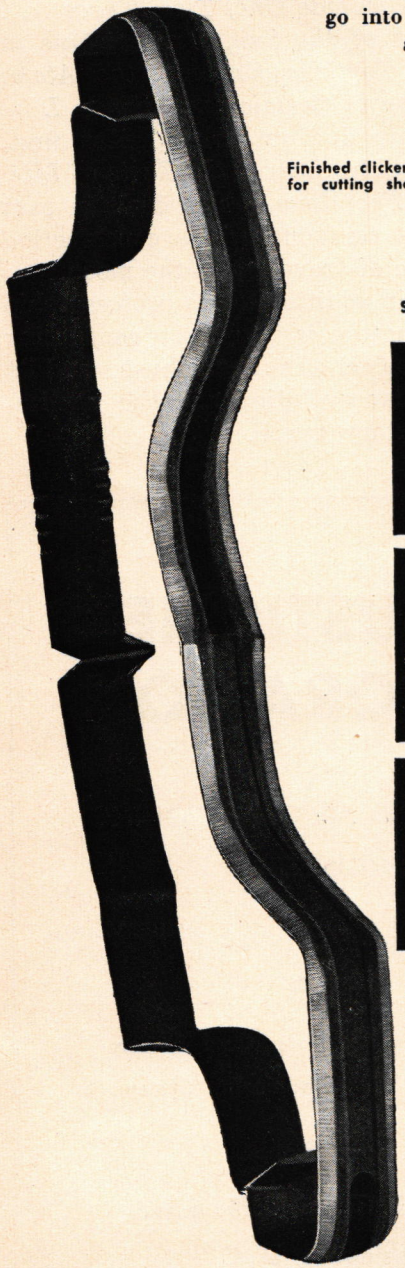
BS

What's Happening at CRUCIBLE

about clicker die steel

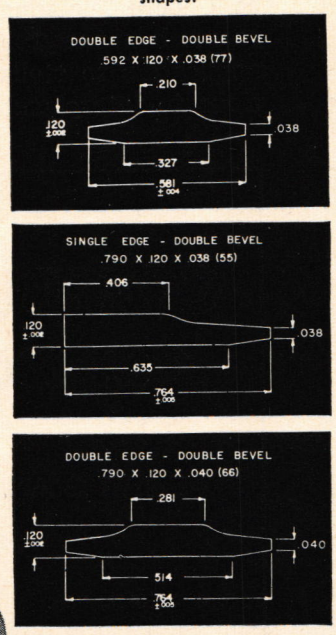
what it is

Clicker die steel is a special cold rolled alloy steel. It is used in making clicker dies for cutting leather, rubber, plastic, felt and fabrics of other compositions that go into the making of shoes and similar products.



Finished clicker die ready for cutting shoe leather.

Some of the clicker die steel standard shapes.



Wider shapes are used when dies are sized by surface grinding after forming and welding. Standard widths are provided when the dies are not to be surface ground.

how it is used

Clicker die steel is furnished to the die maker in either single or double edged form in one of several standard shapes. The die maker first shapes the die by bending the die steel to a pattern that provides the desired configuration, and then welds the two ends at a corner. He finishes the die by grinding a bevel on the outside of the cutting edge and filing the inside edge. Before the finished die is hardened and tempered, the die maker forms identification marks — combinations of circles and squares — in the cutting edge so that the material cut from it may be easily identified as to its size and style.

In the cutting operation, the leather or other material is placed on an oak block in the bed of the clicker machine. Then the die is placed by hand on the material which is cut as the aluminum faced head of the machine presses the die through it. The clicking sound which the head makes as it strikes the die is where the term "clicker machine" derived its name.

what it is composed of

Clicker die steel as produced by the Crucible Steel Company of America is a controlled electric steel in which the combination of carbon and alloy is designed for maximum toughness and proper hardness after heat treatment.

Experience has proved that cold finished clicker die steel is superior to hot rolled material for sizes approximately ¾ inch and narrower because of its lower degree of surface decarburization which permits the use of slightly thinner sections. Cold finished material also has a better surface finish with closer width and thickness tolerances and thinner edges that require less grinding and filing to complete the die.

CRUCIBLE'S engineering service

As with clicker die steel, the Crucible Steel Company of America is the leading producer of special purpose steels. If you have a problem in specialty steels, our staff of field metallurgists with over 50 years experience in fine steel making is available to help you solve it. Crucible Steel Company of America, General Sales and Operating Offices, Oliver Building, Pittsburgh, Pa.

CRUCIBLE first name in special purpose steels

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GAMOW *(Continued from page 12)*

He lectured at Stanford University in the summer of 1936; and participated in the Convegnio Fisica Nucleare at Rome in 1931, the Solvay Congress at Brussels in 1933, the International Physics Congress at London in 1934 and at Warsaw in 1938. He is presently a member of the American Physical Society, The Washington Philosophical Society, The International Astronomical Union, The American Astronomical Society, the American Geophysical Society and for the past two years the Royal Danish Academy of Science.

Professor Gamow is also well known as an author, having written many well received books and articles on physics and astronomy. His most widely read books include *One, Two, Three . . . Infinity, The Birth of the Sun, Mr. Tomkins in Wonderland, Mr. Tomkins Explores the Atom,* and *Atomic Energy in Cosmic and Human Life.* Two new books are due out around May first, the first is *Mr. Tomkins Learns the Facts of Life,* and the second is *The Moon,* which deals in part with the problems confronting the construction of a rocket capable of traveling to the moon.

Doctor Gamow, in addition to his professorship at George Washington, is presently conducting research on the problem of nuclear physics and its application to stellar evolution and the applications to interplanetary travel.

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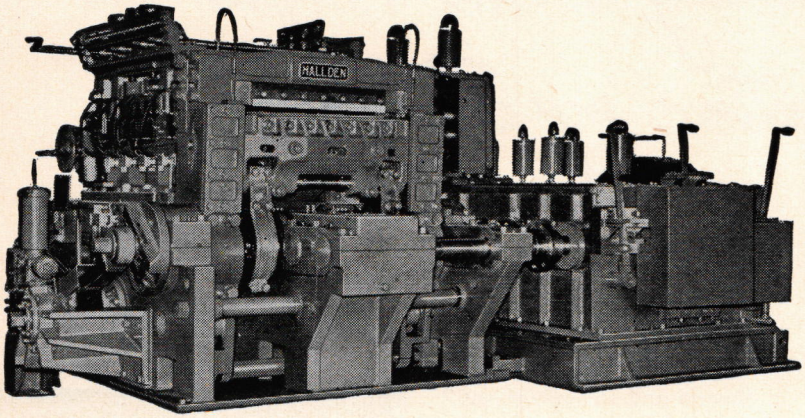
Another page for **YOUR BEARING NOTEBOOK**

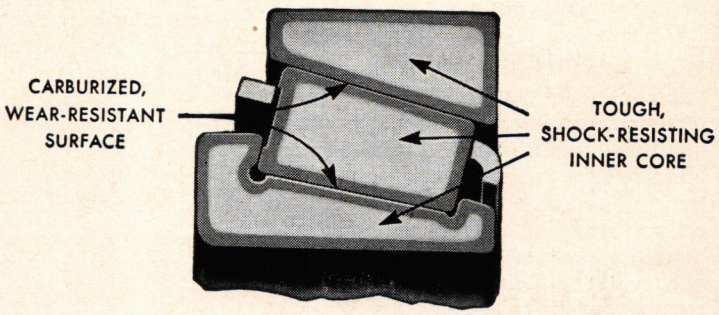


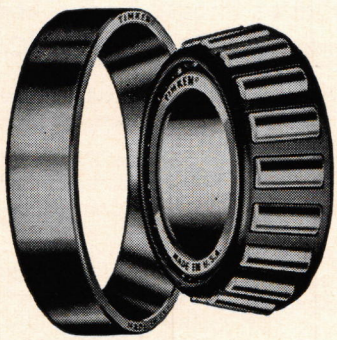
Guillotine shear cuts cost of cutting steel

To carry the terrific shock loads imposed on pinions and gears in this flying shear, engineers mount them on Timken® tapered roller bearings. Maintenance and repair costs are cut, costly breakdowns prevented, accuracy insured. Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. They minimize friction, reduce wear — normally last the life of the machine.

Why TIMKEN® bearings can take the toughest loads

In Timken bearings, the load is carried on a line of contact between the rollers and races instead of being concentrated at a single point. Made of Timken fine alloy steel, the rolls and races are case-carburized to give a hard, wear-resistant surface with a tough core to withstand shock.





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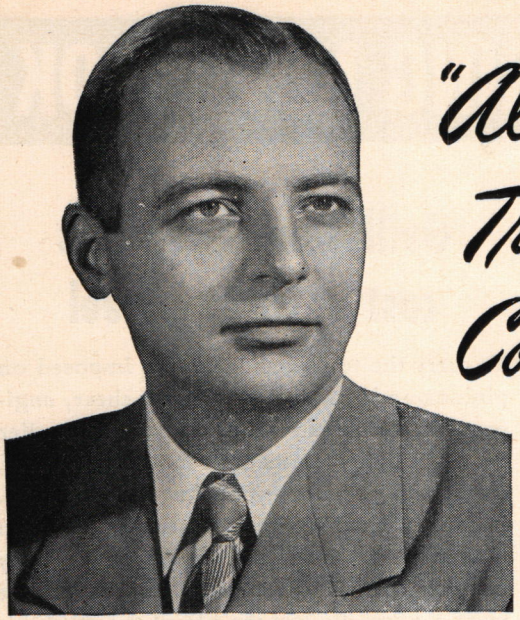
Want to learn more about bearings?

Some of the engineering problems you'll face after graduation will involve bearing applications. If you'd like to learn more about this phase of engineering, we'll be glad to help. Clip this page for future reference, and for a free copy of the 270-page General Information Manual on Timken bearings, write today to The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓞ AND THRUST -ⓞ- LOADS OR ANY COMBINATION ✳



"Allis-Chalmers Graduate Training Course Helped me Continue my Studies."

says ROBERT D. BAIRD, Ph. D.

University of Illinois, B. S.—1942 • University of Wisconsin, M. S.—1949
University of Wisconsin, Ph. D.—1951
and now a member of Engineering Calculations Group

"I'VE ALWAYS been interested in the *basic* problems of engineering. But when I got out of school, I needed additional courses to do the things that interested me. More mathematics—more mechanics were required. Since joining Allis-Chalmers, these gaps have been filled."

Variety of Experience

"I became interested in the Allis-Chalmers Graduate Training Course during a plant tour in my Senior year. As I watched men building steam turbines, electric motors, transformers, pumps, rotary kilns, crushers, and many other products, I was impressed by the variety of experiences to be obtained at A-C. It looked to me like a cross-section of heavy industry. When I found that GTC students choose the departments they work in, as well as the type of work, I decided to join Allis-Chalmers.

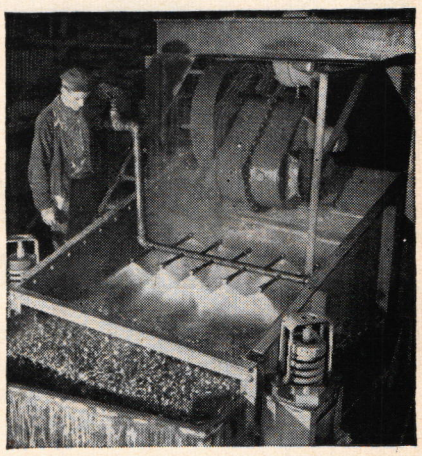
"As a GTC student, I was given every opportunity to work in many departments. However, the basic problems involving aerodynamics, mechanics and elasticity appealed to me and I chose to work primarily on blowers and steam turbines."

Aided by Experts

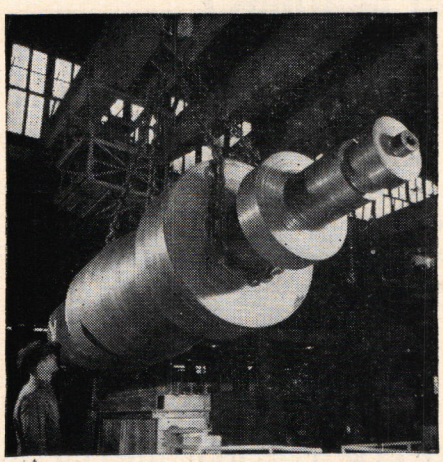
"Since joining A-C, I have had the opportunity to work with the company's leading consultants, and was encouraged to attend evening courses at the University of Wisconsin, in Milwaukee, which led to a Master's degree.

"In 1949 the company awarded me a graduate fellowship for 12 months' residence study at the University of Wisconsin and I got my Doctor's degree in Mechanics.

"So you see, whether you want to do basic engineering or be a sales engineer, designer, production or research engineer, Allis-Chalmers Graduate Training Course offers a wonderful opportunity."



Vibrating screens by Allis-Chalmers are found throughout the world, wherever coal and ore are mined and rock is quarried.



Rough-machined turbine spindle for 120,000-kw steam turbine. Calculating torsional stress and critical speed on shafts like these is part of Baird's job.

Facts Graduates Should Know About Allis-Chalmers Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training.

3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, or specialized equipment with which he will work, such as: steam or hydraulic turbo-generators, circuit breakers, unit substations, transformers, motors, control, pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

5. He will have individual attention and guidance in working out his training program.

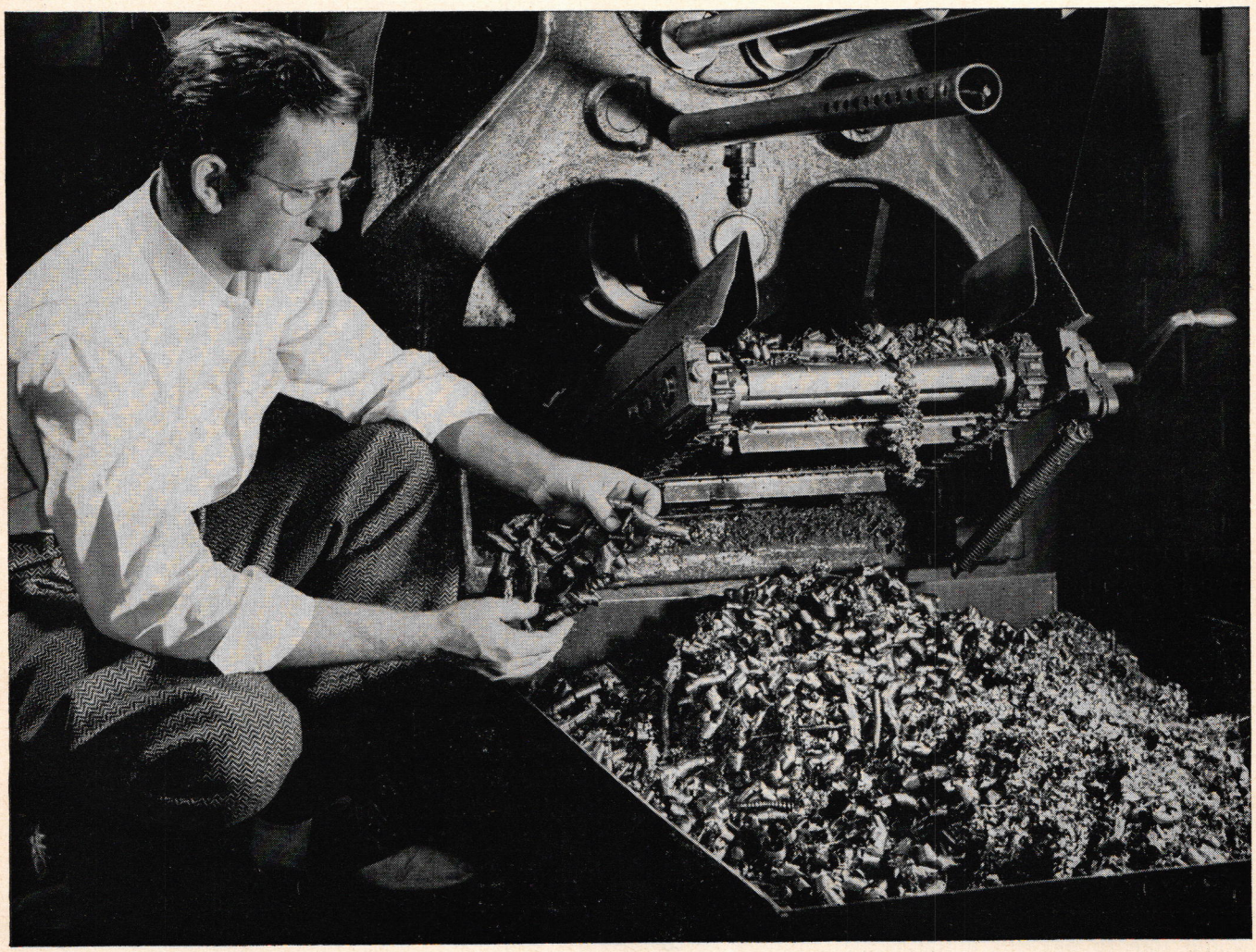
6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

7. For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

Out of the grimy scrap pile come

BETTER STEEL PRODUCTS



How Republic Steel Research is Helping Machine Tool Users...and You!

• An oily mess of steel chips under a machine! So much steel scrap? . . . Yes, but scrap that can tell an important story about the machinability of steel.

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1. Production of the *best-possible* steels and steel products—thousands of them.
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3. Assistance in developing the most efficient and most economical method of processing or fabrication to achieve the desired end result.

This doesn't necessarily mean that Republic works miracles for steel users . . . but it does mean that Republic keeps alert to changing requirements—that Republic is vitally interested in its customers—and that these working policies help to make Republic a good place to work, a good place to stay.

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REPUBLIC STEEL

ALUMNEWS *(Continued from page 18)*

Howard A. Grayson, B.M.E. 1950, has accepted a job as mechanical engineer with Bourne Associates, Inc. and by now has left for Nagoya, Japan. Mrs. Grayson sent us this information and tells us that Howard will send us news from Japan soon.

Murray Berdick, B.S. in Eng. 1942, will receive his Ph.D. in Chemistry this summer. After four years with General Electric and five years with Evans Research & Development Corp., Murray returned to school full time in 1951 in the Institute of Polymer Research at Polytechnic Institute of Brooklyn. Last year Murray was Eli Lilly Research Fellow in Chemistry and now holds the National Science Foundation Fellowship, awarded on the basis of a nationwide competitive examinaiton. He has been elected to Phi Lambda Upsilon (Chemistry Honorary) and Sigma Xi (Scientific Research Honorary).

ALUMS ATTENTION:

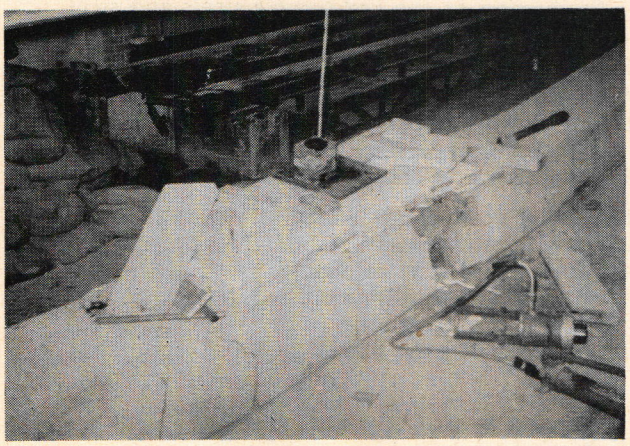
It's been quite a while since many of you have walked the campus at G.W. But not too much time has passed so that you can't remember that school spirit. The "Mecheleciv" would like you to help out your school once again.

The undergrad publishers have been fighting rising costs. Your magazine is supported by income from national and local advertisers and a small fee paid by each engineer student at G.W. In order to "keep our head above water" we need more subscriptions from you. At this time only about 10 per cent of the alums have been subscribing to the magazine.

Many improvements have been planned for the Engineering School and the "Mecheleciv" staff would like to put out a magazine comparable to our school.

CONCRETE *(Continued from page 24)*

Student Chapter; Mr. Richard W. Rumke, who sent out nearly 2,500 invitations to all sections of the country; Dean Martin A. Mason of the School of Engineering, who obtained Lisner Auditorium free of charge (usual charge—$400.00 per day); Arban and Carosi, Inc., who supplied the facilities for the load test and the aforementioned buffet lunch; the speakers—Mr. Stainer, Mr. Hogan, Mr. Anson, Mr. Muller, and Senator Malone; and many other persons and organizations who made this event possible. This was probably the largest and most successful conference ever sponsored by an engineering society student chapter in this country. In the words of Professor Carl H. Walther, faculty advisor of the student chapter, "I have attended many conferences, but I have never seen one better arranged and all persons connected with this conference are to be heartily congratulated."



Mofoto

Prestressed beam after failure. The beam failed at approximately five and three-fourths live loads.

TELEVISION *(Continued from page 11)*

announcer. As the teams or players come onto the field, individual shots are made of each player with telephoto lenses; at the same time the camera which covers the easel is picking up title cards with players names. These name cards are white lettering on a black background. At the switching unit the signal carrying the players picture is added to the signal carrying his name in such a way that the two pictures appear simultaneously on picture tube screens. The camera control operator has made minor operating adjustments to both cameras to allow proper combination of the two signals.

At intervals during the show, usually during lulls in the action, the master control operator will combine the incoming remote signal with a signal from the slide camera to superimpose the sponsor's "trade-mark" over the field shot. There will also be switches to the studio for live commercials, and to the film chain for film inserts. Before each of the film inserts the synchronizing phasing unit is switched out to avoid "phasing bars" in the film picture, and then switched back in so that remote-slide "supers" may be made.

The operating set-up described above is a basic one, in that the four functional units have been described as physically separate and independent. This is not always the case. Since many stations have studios, master-control, and transmitter in the same building, it is sometimes possible to combine parts of the master control equipment and functions with studio control and have the transmitter handle the rest. If the operation is very small, master control, studio control, and transmitter control may be combined as one physical unit.

The opinions expressed in this article are those of the writer, and do not necessarily represent the opinions of any other person or persons.

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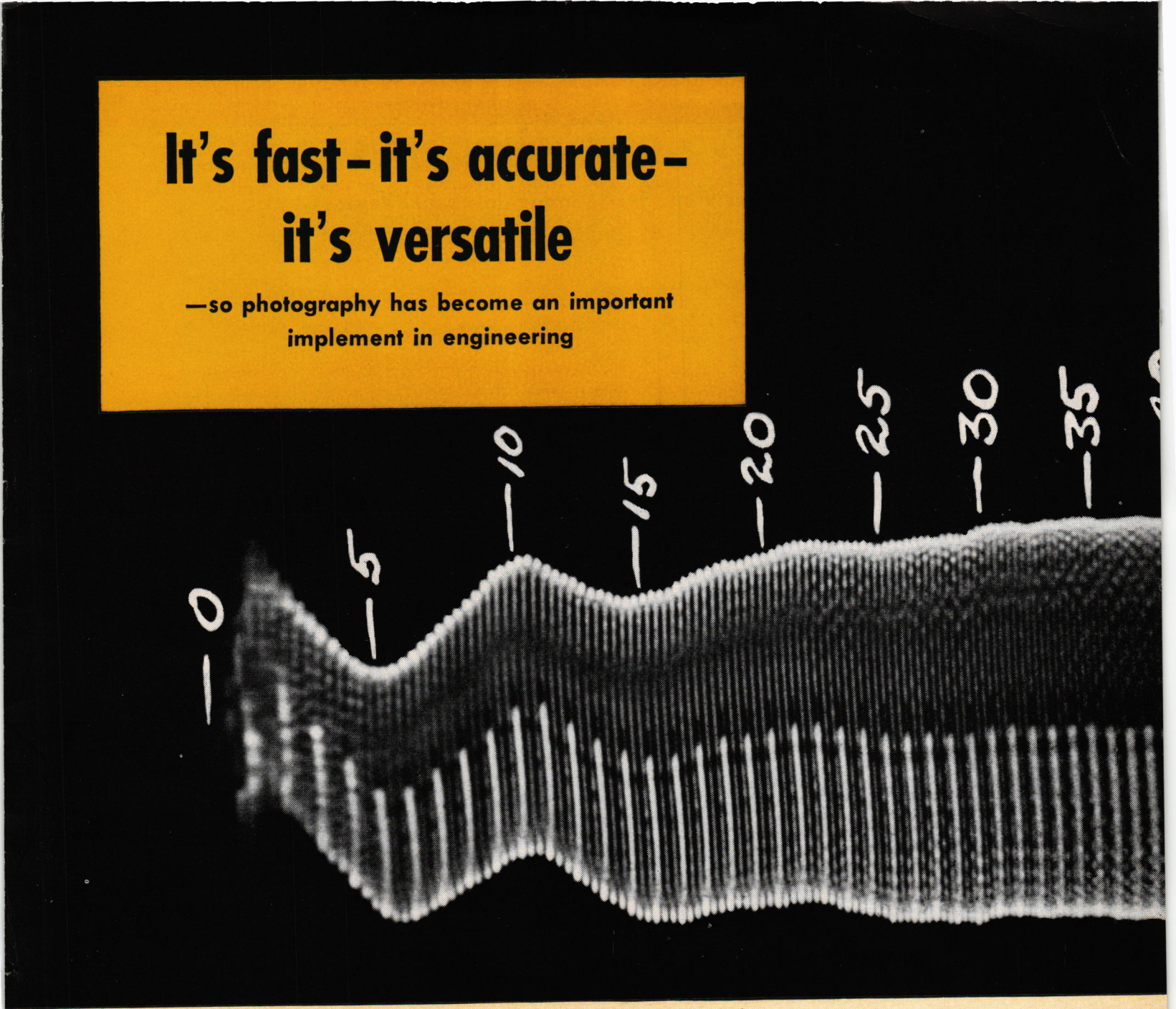
—so photography has become an important implement in engineering



This picture is a photographic recording of a cathode ray oscilloscope trace which shows the speed of the reaction of lithium borohydride with an aqueous acid solution.

PHOTO COURTESY OF THE DEPARTMENT OF CHEMISTRY, ILLINOIS INSTITUTE OF TECHNOLOGY, CHICAGO, ILL.

● In the laboratory, in the design department, the production shop and assembly line, in fact all through modern engineering operations, photography is revealing new information, recording facts, aiding new developments, saving time and conserving effort.

Photography can capture the fleeting flick of the cathode ray, trace, and record important engineering information. It can reproduce engineering drawings—microfilm valuable data for easy transportation or space-saving storage. And high speed movies can slow down fast motion so that it can be seen and studied.

In fact, there are so many ways in which photography aids engineering and so many new applications being found, that many well-qualified graduates in the physical sciences and in engineering have been led to find positions with the Eastman Kodak Company.

If you are interested, write to Business and Technical Personnel Department, Eastman Kodak Company, Rochester 4, New York.

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MY QUESTION TO THE G-E STUDENT INFORMATION PANEL:

"How does your business training program prepare a college graduate for a career in General Electric?"

...CHARLES O. BILLINGS Carnegie Institute of Technology, 1954

The answer to this question, given at a student information meeting held in July, 1952, between G-E personnel and representative college students, is printed below. If you have a question you would like answered, or seek further information about General Electric, mail your request to College Editor, Dept. 123-2, General Electric Company, Schenectady, New York.

R. J. CANNING, *Business Training Course* . . . General Electric's business training program offers the college graduate the opportunity to build a career in the field of accounting, finance, and business management in one of the most diversified companies in the country.

Since its beginning in 1919, more than 3,000 students have entered the program—one of the first training programs in business to be offered by industry.

The program's principal objective is to develop men well qualified in accounting and related business studies, men who can become administrative leaders in the financial and general business activities of the Company.

Selection of men for the program is based on interviews, reviews of students' records, and discussions with placement directors and faculty members. Selection is not limited solely to accounting and business administration majors. A large number of men in the program are liberal arts graduates, engineers, and men with other technical training.

When a man enters the program he is assigned a full-time office position in accounting or other financial work and enrolled in the formal evening education program. This planned classroom work is a most important phase of the program. The material presented is carefully selected and well integrated for the development of an adequate knowledge of accounting and business theory, procedures and policies followed by the Company, acceptable accounting and business practices of the modern economic enterprise, and as a supplement to the practical experience provided by the job assignment.

In general, the program trainee is considered in training for three years during which time advancements are made to more responsible types of accounting work. After completing academic training the trainee's progress and interests are re-examined. If he has demonstrated an aptitude for financial work he is considered for transfer to the staff of traveling auditors or to an accounting and financial supervisory position. From here his advancement opportunities lie in financial administrative positions throughout the Company. Trainees showing an interest and aptitude for work other than financial, such as sales, purchasing, community relations, publicity, etc., are at this time considered for placement in these fields.

Today, graduates of the program hold responsible positions throughout the entire organization. Management positions in the accounting and financial field throughout the Company, such as Comptroller, Treasurer, finance managers, secretaries, and others, are held in large part by graduates of the course. Men who have transferred to other fields after experience in financial work include public relations executives, managers of operating divisions and departments, presidents of affiliated Companies, officials in personnel, employee relations and production divisions, and executives in many other Company activities.

This partial list of positions now filled by former business training men is indicative of the career preparation offered by the business training program, and of the opportunities that exist for qualified men interested in beginning their careers in accounting and financial work.

You can put your confidence in—

GENERAL ELECTRIC